

REMARKS

Claims 1, 10, 11, 20, 21 and 24 stand rejected under 35 USC 102(b) on “Yasuhiko” JP-2000-340894 (actually “Nomura,” which applicants use hereinafter). Applicants respectfully traverse this rejection.

Applicants have amended claim 1 to recite that the quantum well active layer is made of a non-Al based material. In contrast, Nomura discloses the doping of an AlGaAs quantum well active layer. Applicants have furthermore amended claim 1 to recite a quantum well active layer comprising barrier layers and well layers alternately stacked in such a way that the top and bottom layers of the quantum well active layer are barrier layers as detailed in paragraph [0080] of applicants’ specification. Nomura instead discloses a semiconductor laser element 100 in which a quantum well active layer 7 comprises well layers 71 and barrier layers 72 stacked in such a way that the top and bottom layers of the quantum well active layer 7 are well layers 71. Accordingly, Claim 1 is allowable over Nomura.

Applicants have amended claims 11, 21 and 24 in a manner similar to claim 1 and these claims are therefore also allowable for the reasons stated above. Claims 10 and 20 depend from allowable claims and are allowable due at least to their respective dependencies.

Claims 2-5, 12-15, 22, 23, 25 and 26 stand rejected under 35 USC 103(a) on Nomura in view of Fukunaga EP 0 920 096. Applicants respectfully traverse this rejection.

Claim 2 recites doping an InGaAsP quantum well active layer with an impurity of the same conductivity type as that of an upper cladding layer. The Examiner has conceded that Nomura does not disclose or suggest doping an InGaAsP layer with such an impurity, noting instead that Nomura discloses doping an AlGaAs quantum well active layer. Fukunaga discloses a semiconductor laser element having an InGaAsP quantum well active layer, but does not disclose doping this layer. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to dope the

InGaAsP quantum well active layer of Fukunaga with an impurity as taught by Nomura. Applicants respectfully disagree.

Applicants submit that one of ordinary skill in the art would have no motivation to combine the cited references. Paragraph [0002] of Fukunaga explains that the presence of Al in the active layer can cause failure of a semiconductor laser device due to the oxidation of the Al. Fukunaga goes on to explain that using an InGaAsP active layer helps to eliminate this failure mode by making the quantum well active layer using Al-free materials.

Applicants' invention solves a problem that they found to exist when an InGaAsP active layer (or a similar Al-free active layer) is used. As detailed in paragraph [0010] of applicants' specification, applicants discovered that when an Al-free active layer is used, impurities present in the upper cladding layer (such as Zn) have a tendency to diffuse into the active layer, thereby partially disordering the quantum well and obscuring the phase boundary between the barrier layers and the well layers. Applicants then discovered that doping the active layer with impurities of a similar conductive type to those used in the upper cladding layer prevents the diffusion of impurities into the active layer, thereby improving the operability of the semiconductor laser.

Nomura does not disclose or suggest that impurities be added to the AlGaAs active layer to prevent diffusion of impurities into the active layer. In actuality, the structure of Nomura's quantum well active layer discussed above (with the well layers forming the top and bottom layers of the active layer) suggests that Nomura is not concerned with diffusion of impurities into the active layer. Furthermore, there is no indication in either reference that adding impurities into an InGaAsP would have any beneficial effect. It is improper to assume that impurities added to one material for a first beneficial purpose will have a different beneficial effect when added to a different material. Accordingly, no motivation exists in either of the references that would lead one of ordinary skill in the art to look to the other reference.

Claims 12, 22 and 25 recite features similar to claim 2 and are therefore allowable for the reasons detailed above. Claims 3-5, 13-15, 23 and 26 depend from allowable claims and are therefore allowable due at least to their respective dependencies.

Claims 6-9 and 16-19 stand rejected under 35 USC 103(a) on Nomura in view of Fukunaga and Fukunaga (U.S. Patent Publication No. 2002/0044584, hereinafter, "Fukunaga-2"). Applicants respectfully traverse this rejection.

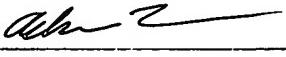
Fukunaga-2 does not disclose or suggest doping an InGaAsP quantum active layer nor does Fukunaga-2 provide any motivation to combine the references as detailed above. Accordingly, claims 6-9 and 16-19, which depend from allowable claims, are allowable due at least to their respective dependencies.

Applicants solicit an early action allowing the claims.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicants petition for any required relief, including extensions of time, and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing Attorney Docket No. 20455-2030500.

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Respectfully submitted,

By 
Adam Keser
Registration No. 54,217
MORRISON & FOERSTER LLP
1650 Tysons Blvd, Suite 300
McLean, Virginia 22102
(703) 760-7301 – Telephone
(703) 760-7777 – Facsimile